CLEAN VERSION OF REPLACEMENT CLAIMS FOR ENTRY DURING PROSECUTION OF US APPLICATION N0. 09/884,879

1. Pump for low flow rates comprising

- a channel which is at least partially filled with a transport liquid (3)
- a membrane (4, 12) at one opening of the channel that can be wetted by the transport liquid,
- a space having an essentially constant vapour pressure of the transport liquid located at the side of the membrane opposite to the transport liquid.

2. Pump as claimed in claim 1, in which the space contains a sorbent (6, 15) which sorbs evaporated transport fluid.

3. Pump as claimed in claim 1, in which the space and the transport liquid are separated from one another by the membrane.

4. (Amended) Pump as claimed in claim 2, in which the sorbent is located in a housing having an opening, wherein the opening is closed by the membrane.

5. (Amended) Pump as claimed in claim 4, in which the sorbent has no direct contact with the membrane.

6. Pump as claimed in claim 1, in which the space is formed by a housing (7') which exchanges evaporated transport liquid with the outer space.

7. Pump as claimed in claim 1, in which the membrane is hydrophilic.

8. (Amended) Pump as claimed in claim 2, in which the membrane has a hydrophilic region facing the transport liquid and a hydrophobic region which faces the sorbent.

9. Pump as claimed in claim 8, in which the sorbent is in contact with the hydrophobic region of the membrane.

10. Pump as claimed in claim 1, which has at least one non-wettable membrane (5) which is located on a side of the wettable membrane facing away from the transport liquid.

11. Pump as claimed in claim 1, in which the channel contains a working liquid that is segmented from the transport liquid.

12. Pump as claimed in claim 1, in which the membrane is formed by an array of capillary channels.

13. Pump as claimed in claim 12, in which the capillary channels are located in a body in which the channel conveying the transport liquid is also located.

14. (Amended) Pump as claimed in claim 12, in which the capillary channels are manufactured by microtechnology using etching processes, laser machining, or by stamping, injection moulding or moulding processes.

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15. (Amended) Pump as claimed in claim 12, in which the array comprises 3 to 100 capillary channels.

16. Pump as claimed in claim 12, in which the capillary channels of the array have a diameter of the individual channels in the range of 10 nm to 100 µm.

17. Microdialysis system comprising a pump as claimed in claim 1 and a microdialysis membrane past which the transport liquid or a working liquid is transported by the pump.

18. Microdialysis system as claimed in claim 17 containing a sensor located downstream of the microdialysis membrane for the detection of one or several analytes in the transport or working liquid.

19. Ultrafiltration device comprising a pump as claimed in claim 1 and an ultrafiltration membrane through which the body fluid is drawn into the channel.

20. Ultrafiltration device as claimed in claim 19 containing a sensor located downstream of the ultrafiltration membrane for the detection of one or several analytes in the body fluid.

21. System for pumping a working liquid at a low flow rate, wherein at least one dilution reservoir (22) containing a liquid which is essentially free of substances that cannot evaporate at the membrane is located between the fluid system in which the working liquid is located and a pump as claimed in claim 1.

22. System as claimed in claim 21, in which two or more reservoirs that are connected to one another (22^1, 22^2, 22^3, 22^4, 22^5, 22^6, 22^7, 22^8) which form a dilution cascade are arranged between the fluid system containing the working liquid and the pump.

23. Pump as claimed in claim 3, in which the space contains a sorbent and in which the sorbent is located in a housing having an opening, wherein the opening is closed by the membrane.

24. Pump as claimed in claim 23, in which the sorbent has no direct contact with the membrane.

25. Pump as claimed in claim 13, in which the capillary channels are manufactured by microtechnology using etching processes, laser machining, or by stamping, injection moulding or moulding processes.

26. A pump comprising:

a housing defining a space and including a channel, the channel being at least partially filled with a transport liquid, and

a membrane positioned in the housing, the membrane including a first side facing toward the liquid and a second side facing the space, wherein the space has an essentially constant vapour pressure of the transport liquid.

27. The pump of claim 26 further comprising a sorbent positioned in the space.

28. The pump of claim 27 wherein the sorbent is spaced apart from the membrane.

29. The pump of claim 27 wherein the membrane separates the transport liquid and the space from one another.

30. The pump of claim 26 wherein the membrane separates the transport liquid and the space from one another.

31. The pump of claim 26 wherein the housing comprises a means for exchanging evaporated transport liquid with a space outside the housing.

32. The pump of claim 26 wherein the membrane is hydrophilic.

33. The pump of claim 26 wherein the membrane has a hydrophilic region facing the transport liquid and a hydrophobic region facing the space.

34. The pump of claim 26 further comprising at least one non-wettable membrane positioned in the space.

35. The pump of claim 26 further comprising a working liquid positioned in the channel that is segmented from the transport liquid.

36. The pump of claim 26 wherein the membrane is formed to include capillary channels.

37. The pump of claim 36 wherein the membrane includes 3 to 100 capillary channels.

38. The pump of claim 37 wherein the membrane includes 5 to 25 capillary channels.

39. The pump of claim 36 wherein the capillary channels each have a diameter of 10 nm to 100 μm.

40. The pump of claim 36 wherein the housing includes a base plate and a cover and the channel is formed in the base plate.

41. The pump of claim 40 wherein the membrane is disposed between the base plate and the cover.

42. The pump of claim 40 wherein the space is formed in the cover.

43. The pump of claim 36 wherein the housing is formed to include openings in communication with the space.

44. A method of producing flow rates of a transport liquid of about 1 to 1000 nl/min, the method comprising the steps of:

providing a pump comprising a housing defining a space and including a channel and a wettable membrane positioned in the housing, the membrane including a first side facing toward the channel and a second side facing the space,

at least partially filling the channel with the transport liquid,

contacting the wettable membrane with the transport liquid to generate an underpressure in the channel,

evaporating the transport liquid at the wettable membrane to remove the transport liquid from the channel and to create an underpressure in the channel, and

maintaining a generally constant vapour pressure of the transport liquid in the space.

45. The method of claim 44 wherein the transport liquid penetrates the membrane due to capillary effects.

46. The method of claim 45 wherein the transport liquid evaporates through the membrane.

47. The method of claim 44 further comprising the step of at least partially filling the channel with a working liquid.

48. The method of claim 47 further comprising the step of segmenting the transporting and working liquids.